

DETAILED ACTION

1. The papers submitted 14 October 2009, amending claims 31 and 37-39 and canceling claims 40-42 are acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 31-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 31 provides for the use of "aggregate particulate materials" (line 12 as amended), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

5. The remaining claims are rejected due to their dependence on claim 31.

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claim 31 is rejected under 35 U.S.C. 101 because the claimed recitation of a use (see 112 rejections above), without setting forth any steps involved in the process,

Art Unit: 1791

results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

Art Unit: 1791

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 31, 33, 34, 37 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beall et al. (US 6,506,336 B1) in view of Wójcik et al. (*EFFECT OF SELECTED PARAMETERS ON GRINDING PROCESS OF ALUMINA IN THE ROTARY-VIBRATION MILL*) and Pober et al. (US 4,781,671).

12. Regarding claim 31, Beall discloses a method of molding ceramic honeycomb structures (**see abstract and col. 6 l. 53-55**) with the steps of: mixing multiple aggregates (**see col. 3 l. 53 to col. 4 l. 4 and col. 6 l. 8-10**); adding a binder, which includes water, with kneading to form a uniform mixture (**see col. 6 l. 10-11, 25 and 44-48**); forming the clay into a honeycomb structure containing cells separated by walls (**see col. 6 l. 49-55 and col. 7 l. 45-49**); and drying the structure (**see col. 6 l. 56-58**).

13. Beall does not appear to expressly disclose that the mixing step mixes the materials so as to inhibit generation of an agglomerate and set a TG mixture degree to 0.2 or less by use of either an aggregate particulate materials that is classified beforehand or an aggregate particulate material whose surfaces are coated before the start of mixing; and a means for mixing the materials while applying pressurizing vibration to the materials in order to avoid agglomeration of the mixture with the clay.

14. However, Wójcik discloses a method of grinding alumina for production of ceramics (**see abstract**) wherein the aggregate alumina is classified beforehand, i.e. into finer alumina A and coarser alumina B (**see p 116 Material and pp. 122-123 Discussion**) and is ground/mixed by pressurized vibration, i.e. in the rotary vibration

Art Unit: 1791

mill, to specific sized particles (**see p 117 Characteristics of RVM and pp. 122-123 Discussion**), which necessarily would inhibit the mixing of agglomerates into the clay because it is designed to grind the agglomerates to a specific size before forming the green/sintered molded article.

15. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of Beall to include grinding/mixing of Wójcik, in order to control size of the alumina particles and thus affect green and sintered density as well as shrinkage of the molded article (**see Wójcik pp. 115-116 Introduction**), additionally one of ordinary skill in the art would adjust the mixing order and kneading as discussed in Beall (**see col. 6 I. 24-48**) as well as the filling ratio, media ratio, suspension ratio, frequency and ball diameter as discussed in Wójcik (**see p. 124 CONCLUSIONS**), in order to optimize the uniformity of the mixture, i.e. a consistent amount of binder/water with aggregate within the entire mixture or between multiple samples of the mixture, which is analogous to the coefficient of variation (TG mixture degree) of the mass decrease ratio at a given temperature as measured multiple times with a thermogravimeter, (**see MPEP 2144.05 II**).

16. Further, modified Beall does not appear to expressly disclose that aggregate particulate material is classified beforehand to remove the mixed agglomerates.

17. However, Pober discloses a system for classification of particulate materials, specifically alumina powders (**see abstract and col. 7 example 1**), into narrow size distributions, i.e. removing larger agglomerates (**see col. 7 example 1**).

Art Unit: 1791

18. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of modified Beall to include the classification of Pober, in order to allow better control of the shrinkage variability and surface finished of the sintered final products **(see col. 1 l. 24-37)**.

19. Regarding claim 33, Beall discloses that the binder/water system includes sodium stearate, which one of ordinary skill would recognize is a surfactant that acts as a dispersant.

20. Regarding claim 34, Wójcik discloses that the pressurized vibration is generated in a rotary vibration mill which contains the forming material and balls, i.e. pebbles, within a container and vibrating the container **(see p 117 Characteristics of RVM)**.

21. Regarding claim 37, Beall discloses that the mixture contains alumina (Al_2O_3) or alumina forming particles, specifically aluminum trihydrate ($\text{Al}(\text{OH})_3$), with mean particle diameter of less than 5 microns **(see abstract, col. 7 l. 43-44 and Table I)**, which overlaps the claimed range **(see MPEP 2144.05)**.

22. Regarding claim 39, Beall discloses that the honeycomb structure has wall thickness of 2-4 mils (50-100 microns) thus one of ordinary skill in the art would recognize that the width of the extruder die would be about 2-4 mils (50-100 microns) **(see col. 7 l. 48-49)**, additionally the average particle diameters of the dry powder mixture is 6.6 microns **(see Table I)**. Therefore one of ordinary skill in the art would recognize that the dry powder could easily pass through a sieve with apertures that are 4/5 or less the width of the extruder die, i.e. 40-80 micron apertures. Additionally Wójcik discloses an alternative technique for sizing the dry powder by passing it through sieves

Art Unit: 1791

of 400 microns and then 60 microns in order to destroy agglomerates (**see p 118 Sample Preparation**), which is within the aperture range given by Beall.

23. Claims 32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beall et al. (US 6,506,336 B1) in view of Wójcik et al. (*EFFECT OF SELECTED PARAMETERS ON GRINDING PROCESS OF ALUMINA IN THE ROTARY-VIBRATION MILL*) and Pober et al. (US 4,781,671) as applied to claim 31 above, further in view of Beall et al. (US 6,300,266 B1).

24. Regarding claim 32, Modified Beall '336 discloses that the binder/water system is mixed with the inorganic powder mixture and this binder/powder mixture was kneaded to form a uniform mixture for forming a ceramic body (**see col. 6 l. 24-48 and col. 7 l. 27-35**).

25. Modified Beall '336 does not explicitly discloses that the mixing is performed in two stages, i.e. a mixing step forming a wet powder and kneading stage forming the ceramic molding compound.

26. However, Beall '266 discloses a method of forming honeycomb structures from cordierite with substantially the same process as described in Beall '336 (**see title/abstract**), wherein the mixing a kneading process are preformed in two stages the first stage the binder/water mixture is added to the dry powder in an amount less than is needed to plasticizes the batch then the binder/powder batch (wet powder) is plasticized in a separate stage (**see col. 5 l. 28-52**).

Art Unit: 1791

27. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the mixing of Beall '336 to include the two stages of Beall '266, in order to form a more uniform mixture.

28. Regarding claim 35, Beall '266 discloses that the kneading step includes shearing the with a mixer such as a twin screw extruder/mixer, auger mixer or double arm mixer, all of which one of ordinary skill in the art would recognize include a stirring blade which rotates to stir/shear the forming material (**see col. 5 l. 43-46**).

29. Claims 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beall et al. (US 6,506,336 B1) in view of Wójcik et al. (*EFFECT OF SELECTED PARAMETERS ON GRINDING PROCESS OF ALUMINA IN THE ROTARY-VIBRATION MILL*) and Pober et al. (US 4,781,671) as applied to claim 1 above, further in view of Mason et al. (US 4,499,561).

30. Regarding claim 36, modified Beall does not appear to expressly disclose that the mixing and kneading steps are preformed with individual devices and that the devices are connected.

31. However, Mason discloses a method for producing a slurry of plaster, i.e. a ceramic, and water (**see abstract**) wherein the process includes a screw conveyor (21) for agitating the plaster, a hopper (54) in which the water and plaster are initially mixed and an integrally connected to a kneader (59) (**see col. 5 l. 4-60 and fig. 1-2**).

32. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the mixing/kneading of modified Beall to include the

Art Unit: 1791

separate and connected mixer and kneader of Mason, in order to increase process speed and efficiency by creating a continuous process that does not require a transfer step between the mixing and operation and the kneading step.

33. Regarding claim 37, modified Beall does not appear to expressly disclose that the water is added by spraying.

34. However, Mason discloses that the water is sprayed (**see col. 5 l. 27-35**).

35. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the water addition of modified Beall to include the spraying of Mason, in order to provide a more uniform mixture by incorporating the water over a volume of the dry powder rather than in a single concentrated volume.

Response to Arguments

36. Applicant's amendments/arguments, see pp. 5-7, filed 14 October 2009, with respect to the 35 USC 101 rejections of claims 37 and 39 have been fully considered and are persuasive. The 35 USC 101 rejections of 37 and 39 have been withdrawn.

37. Applicant's arguments with respect to claim 31, regarding the limitation "classified beforehand", have been considered but are moot in view of the new ground(s) of rejection.

38. Applicant's remaining arguments filed 14 October 2009 have been fully considered but they are not persuasive.

39. Regarding the 35 USC 112 and 101 of claim 31, applicants' amendment has partially overcome the rejection, namely the "use" recitation in the preamble, however

Art Unit: 1791

the claim still recites a "use" (see line 12 as amended) and rejected as discussed above is maintained.

40. Applicant argues that claim 31 requires that the TG mixture degree is determined from the particles of a dry mixture, it is noted that the features upon which applicant relies (i.e., a dry mixture) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claim merely requires that the mixing step mixes the materials so as to inhibit generation of an agglomerate and a set TG mixture degree, which as discussed above is analogous to the uniformity of the mixture, and does not indicate at which process step these agglomerates are inhibited from forming nor the process step in which the TG mixture degree is determined. Additionally, the claim also indicates that the mixing is performed in order to avoid the mixture of the agglomerate into the **clay**, which is formed from kneading the wet mixture. Furthermore, Beall '336 expressly discloses mixing the dry raw materials to form intimate mixture followed by addition of a binder, i.e. water, (**see col. 6 l. 8-10**). Furthermore in response to applicant's argument that Wójcik does not disclose a mixing step, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this instance, as discussed above, one

Art Unit: 1791

of ordinary skill in the art would adjust the mixing order and kneading as discussed in Beall (**see col. 6 l. 24-48**) as well as the filling ratio, media ratio, suspension ratio, frequency and ball diameter as discussed in Wójcik (**see p. 124 CONCLUSIONS**), in order to optimize the uniformity of the mixture, i.e. a consistent amount of binder/water with aggregate within the entire mixture or between multiple samples of the mixture, which is analogous to the coefficient of variation (TG mixture degree) of the mass decrease ratio at a given temperature as measured multiple times with a thermogravimeter, (**see MPEP 2144.05 II**).

41. With respect to claims 32-39, applicant presents no further arguments other than those addressed above with respect to claim 31.

Conclusion

42. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Oh et al. (*EFFECT OF PARTICLE SIZE DISTRIBUTION AND MIXING HOMOGENEITY ON MICROSTRUCTURE AND STRENGTH OF ALUMINA/COPPER COMPOSITES*) and Tarì et al. (*Influence of Particle Size Distribution on Colloidal Processing of Alumina*) both discuss the formation of ceramic green and sintered articles from mixtures of Alumina aggregate and provide further evidence of one of ordinary skill in the art of alumina containing ceramics manufacturing.

43. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

Art Unit: 1791

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

44. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

45. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN SCHIFFMAN whose telephone number is (571)270-7626. The examiner can normally be reached on Monday through Thursday from 9AM until 4PM.

46. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CHRISTINA JOHNSON can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1791

47. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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